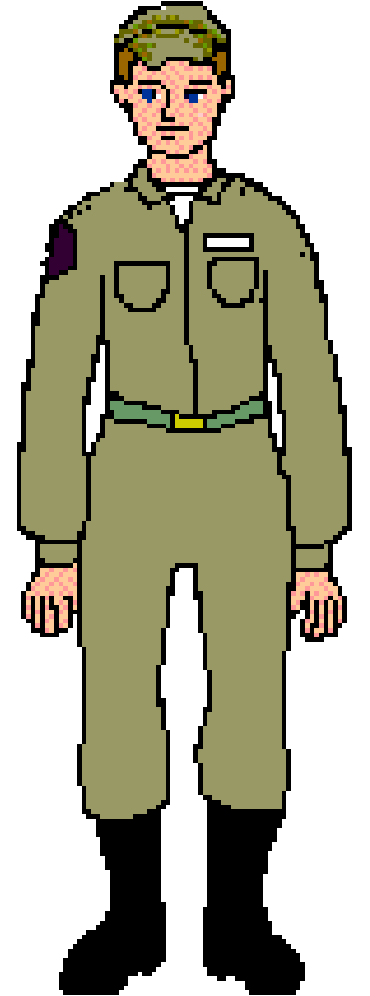




# Armed Forces College of Medicine

**AFCM**  
**ANATOMY DEPARTMENT**





# **UPPER LIMB**

## **Nerve Injury I**

**By**

**Prof Azza Kamal**

# ILO

**By the end of this lecture the student will be able to:**

- 1. Describe the distribution of musculocutaneous, ulnar & median nerves.**
- 2. Discuss the effects of injury of these nerves.**
- 3. Predict the resulting deformity from these nerves' injuries.**



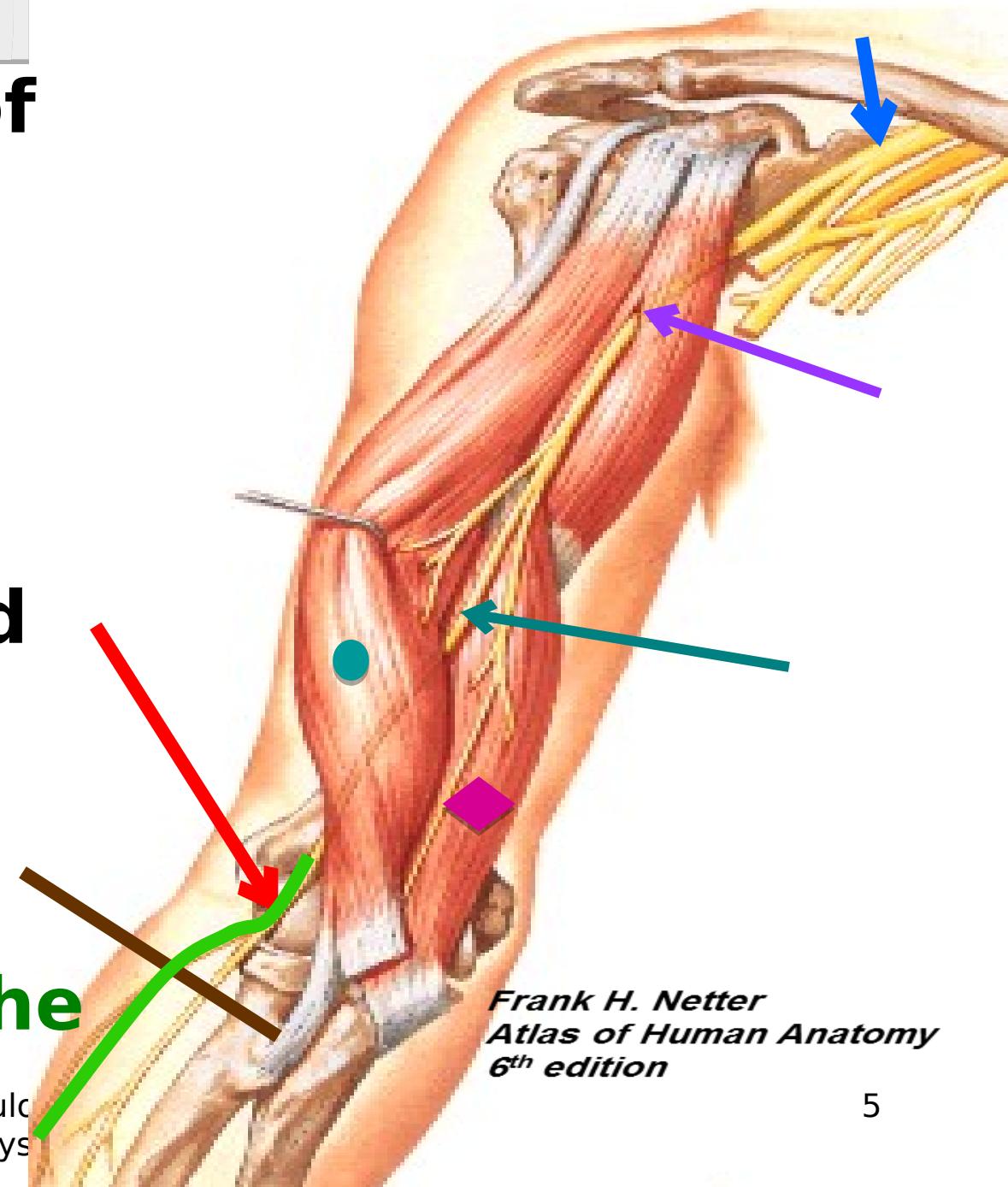
# KEY POINTS

- 1. Branches of musculocutaneous, ulnar & median nerves.**
- 2. Effects of injury of these nerves.**
- 3. Deformity resulting from these nerves' injuries.**



# Musculocutaneous nerve:

- Branch from **lateral cord** of brachial plexus C5,6,7
- Enters arm by **piercing** coracobrachialis
- Runs downwards and laterally **between biceps** and **brachialis**
- Ends **lateral** to **biceps tendon**, by becoming the **lateral cutaneous nerve of the forearm**.



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## Branches of musculocutaneous nerve:

▪ **Muscular** : to the three muscles of the flexor compartment of the arm

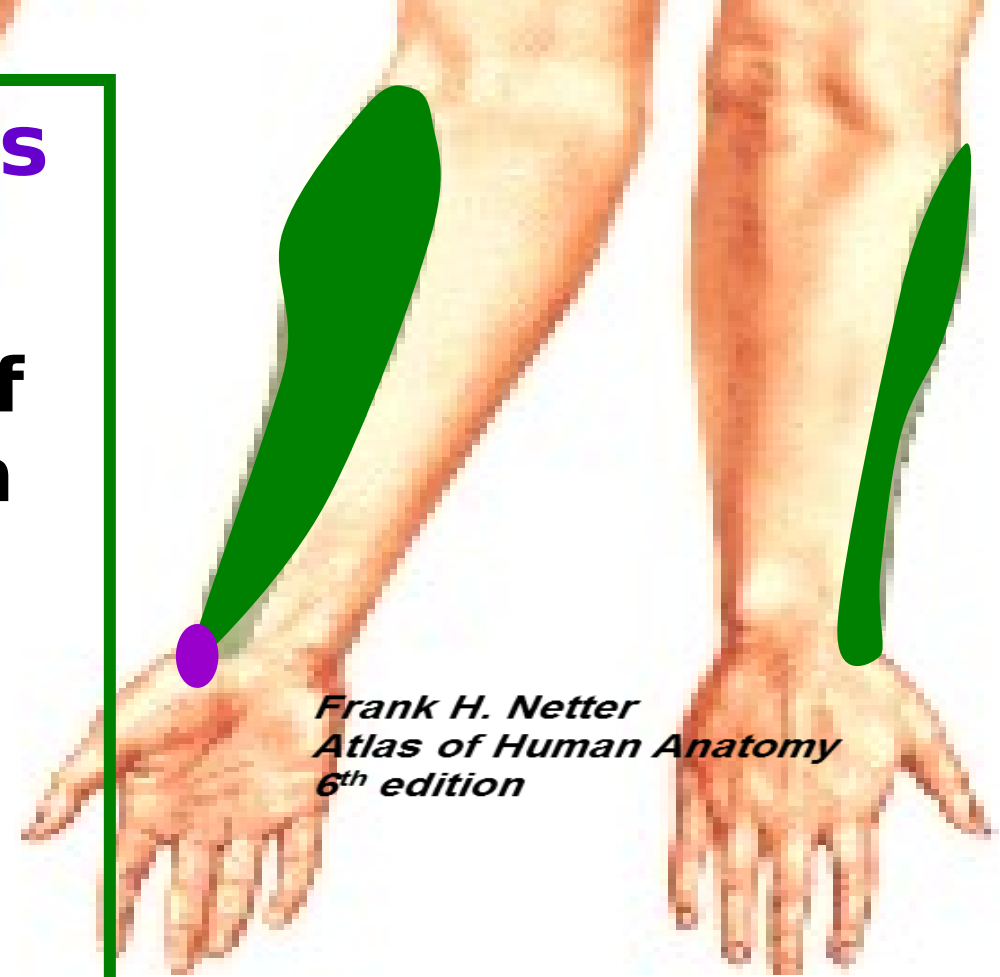
**BBC {Biceps, Brachialis & Coracobrachialis}**, except the lateral part of brachialis (by radial nerve)

▪ **Cutaneous: lateral cut. nerve of**

**Musculocutaneous nerve is liable to injury in fractures of upper part of shaft of humerus or during repairs of these fractures. Its injury → paralysis of flexors of the**

**Biceps is paralysed but supinator is working.**

**Loss of sensation in area supplied by musculocutaneous n.**

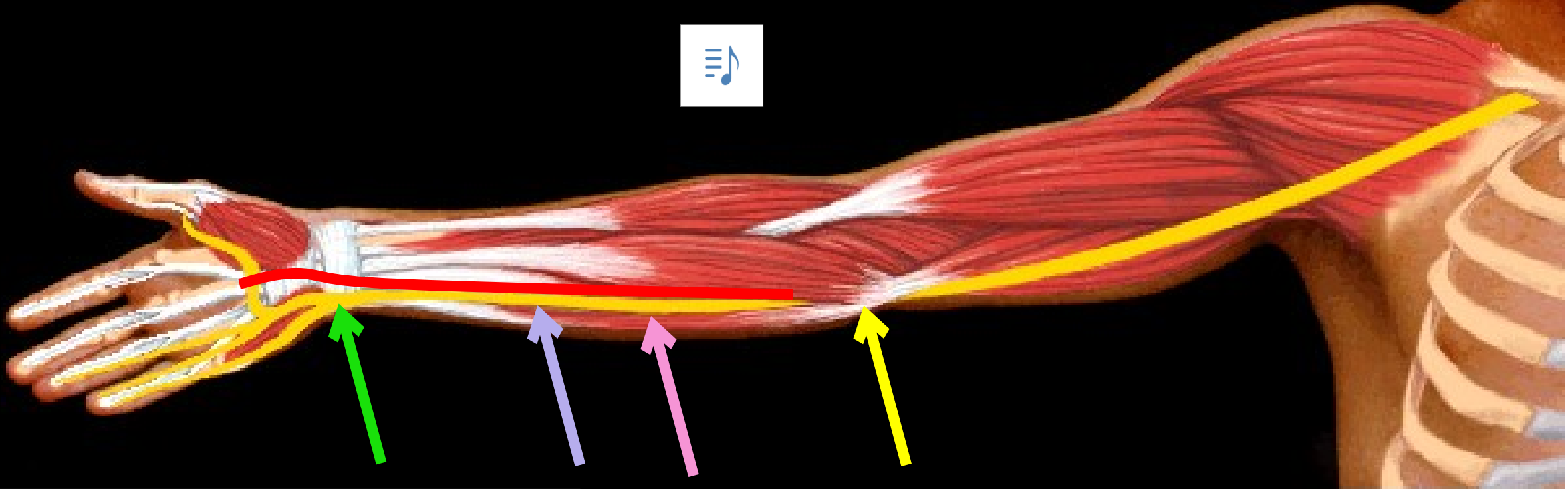


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# Ulnar nerve enters the hand superficial to the flexor retinaculum



<https://www.google.com.eg/search?sa=G&hl=en-EG&q=ulnar>

6/11/24

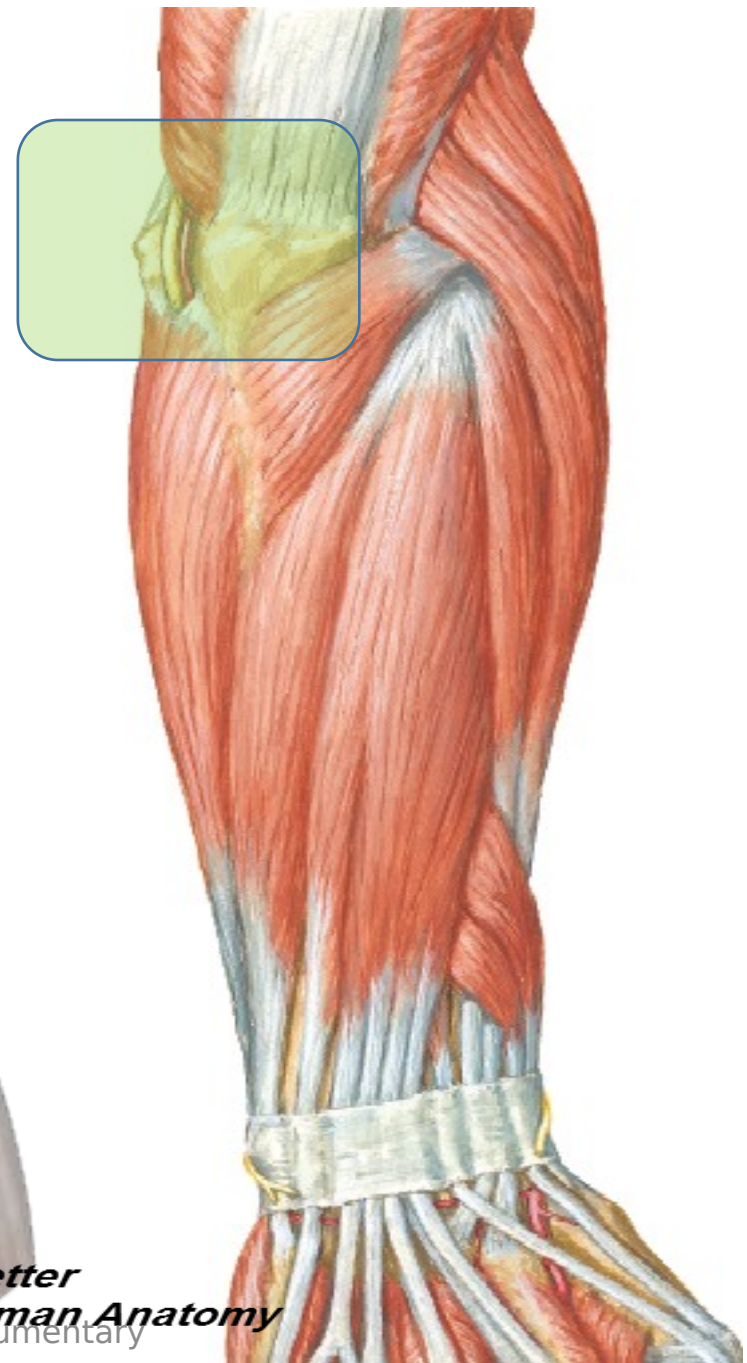
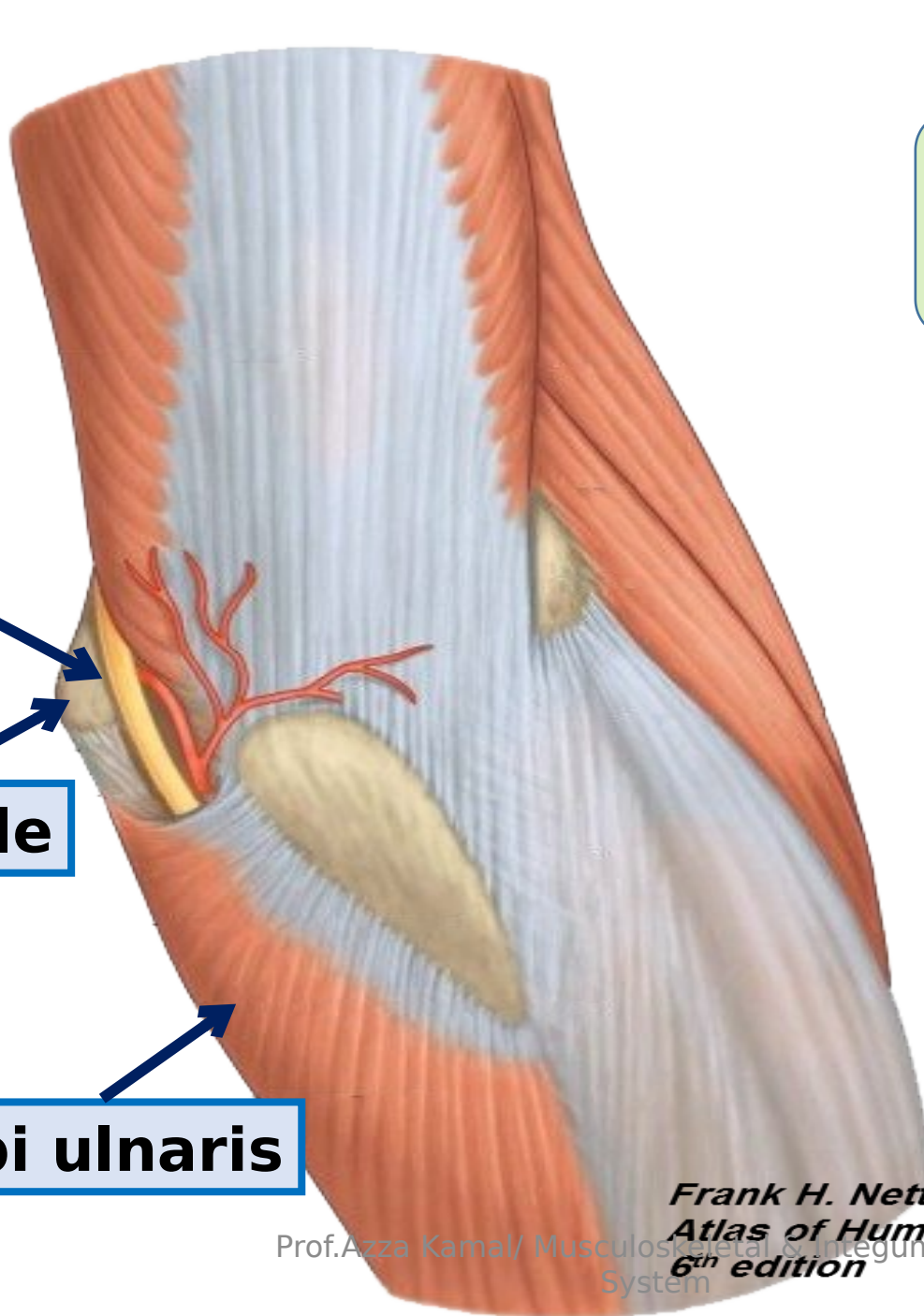
**ULNAR NERVE**  
C7 & T1  
Prof. Azza Kamal/ Musculoskeletal & Integumentary System



**Ulnar nerve**

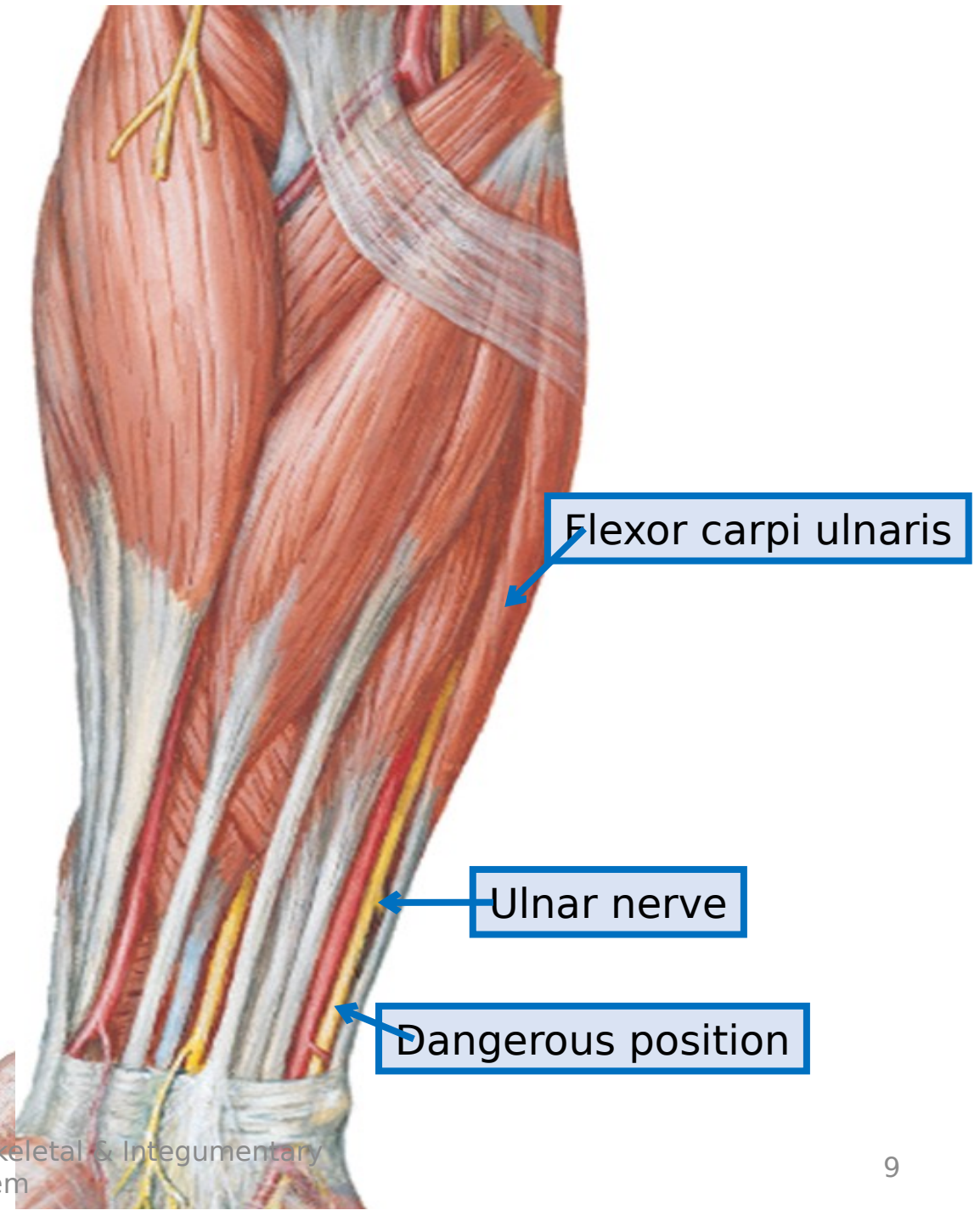
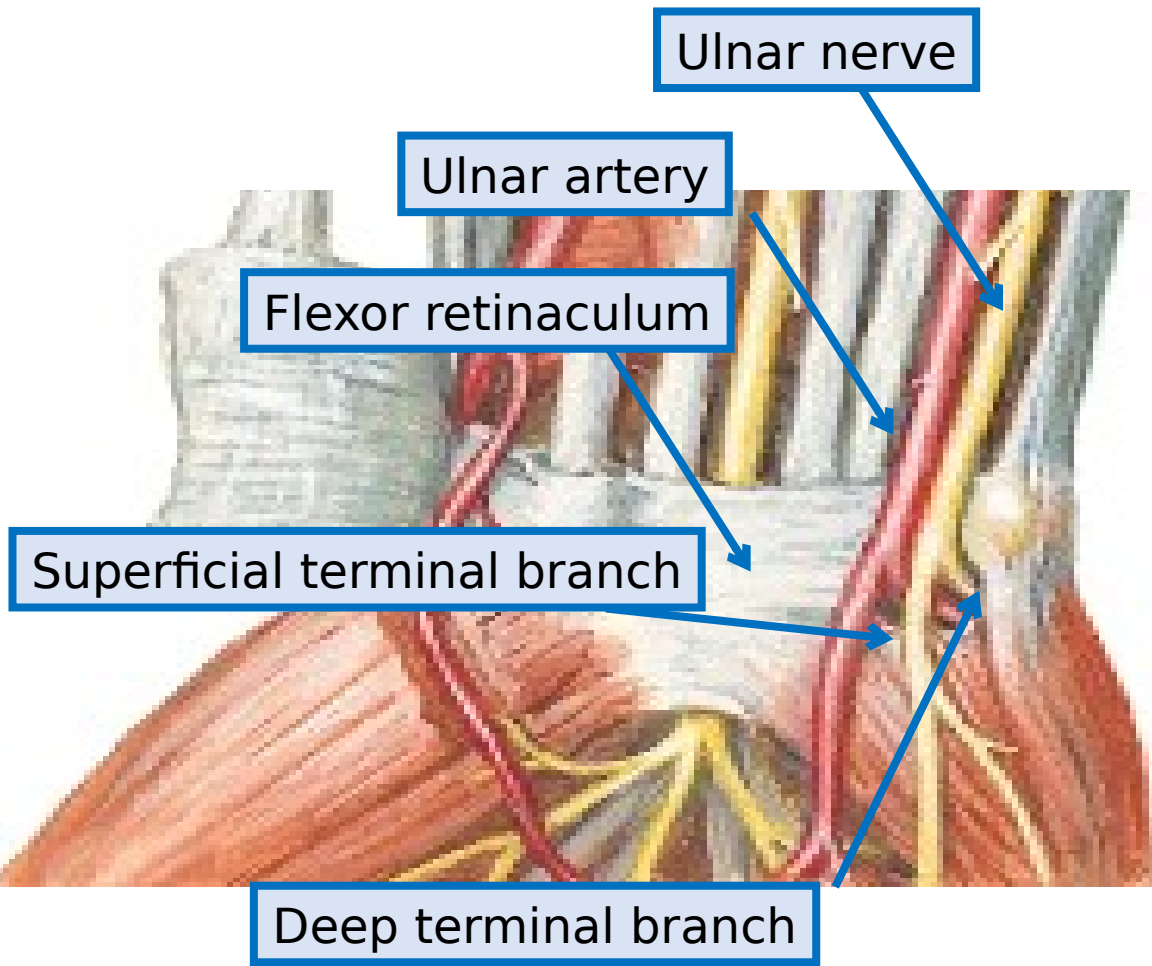
**Medial epicondyle**

**Flexor carpi ulnaris**



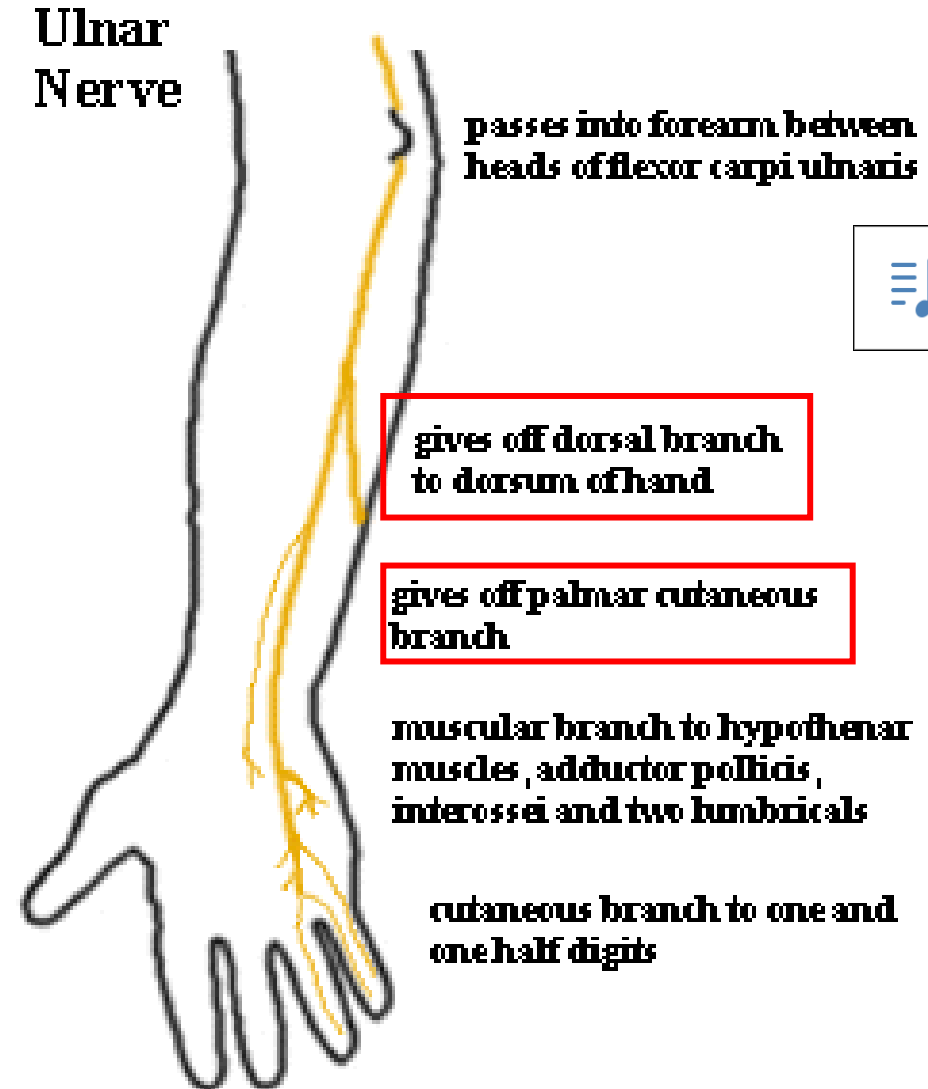
*Frank H. Netter  
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6<sup>th</sup> edition*





# Branches of ulnar nerve in forearm:

1. Muscular: to flexor carpi ulnaris & medial  $\frac{1}{2}$  of flexor digitorum profundus
2. Articular: to elbow joint
3. Cutaneous:
  - **Palmar** for skin of medial  $\frac{1}{3}$  of palm
  - **Dorsal** branch for skin of medial  $\frac{1}{3}$  of dorsum of hand & dorsum of medial  $1\frac{1}{2}$  fingers



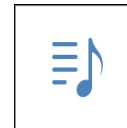
# Brs of Ulnar nerve in Forearm

**Articular to elbow joint**

**Muscular to flexor carpi ulnaris & medial half of flexor digitorum profundus**

**Palmar cutaneous to skin of medial 1/3 of palm of hand**

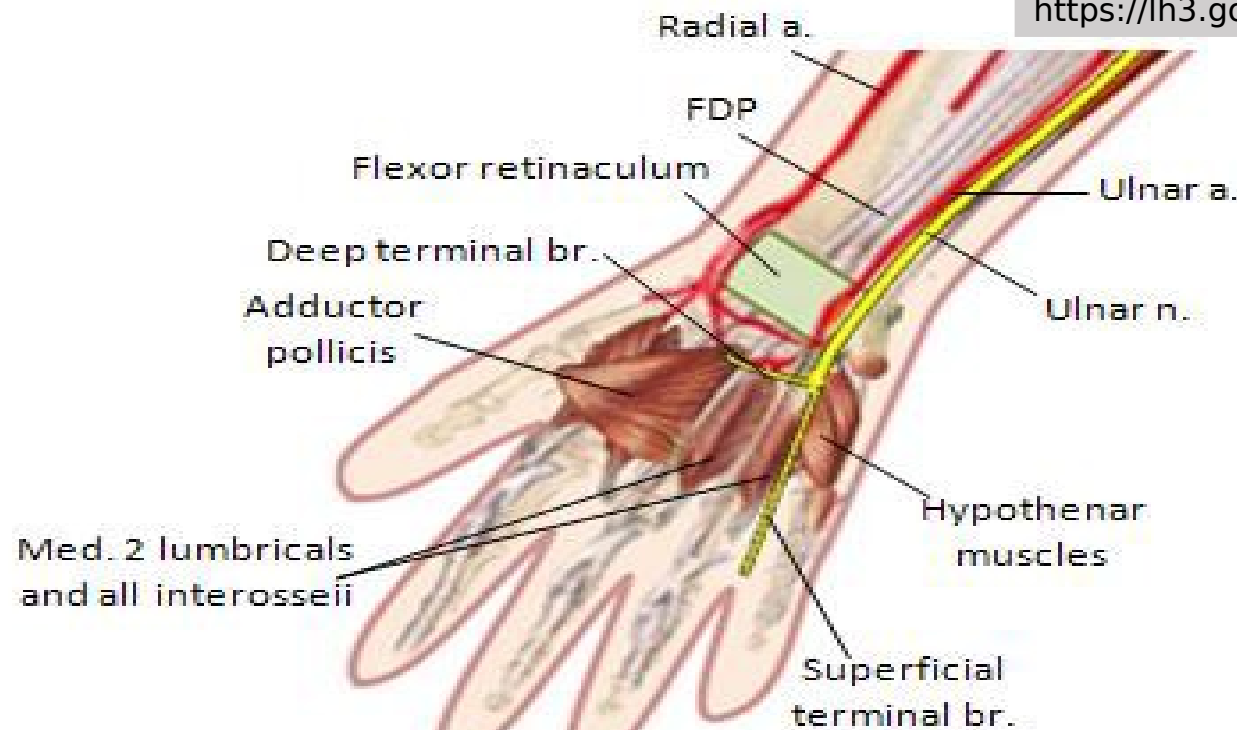
**Dorsal branch for skin of medial 1/3 of dorsum of hand & dorsal surface of medial 1½ fingers**



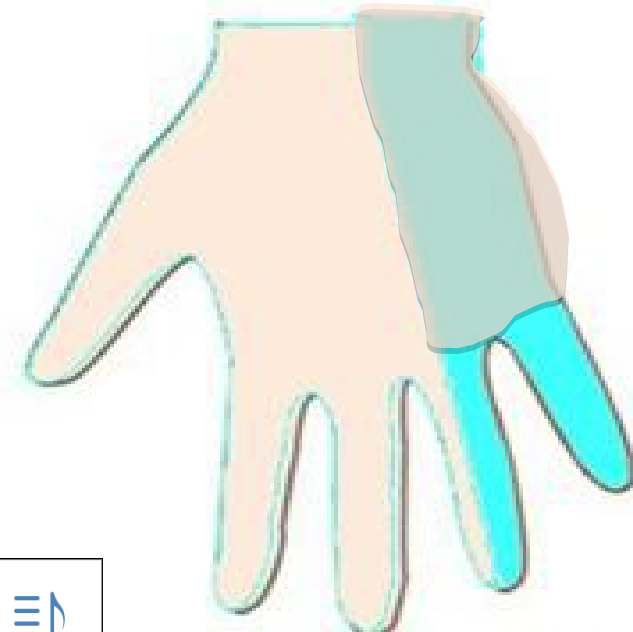
# Branches of ulnar nerve in hand:

1. **Superficial branch** to palmaris brevis and skin of palmar aspect of medial 1½ fingers
2. **Deep branch** to hypothenar muscles, adductor pollicis, medial 2 lumbricals and all interossei

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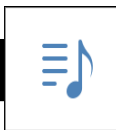
FDP = flexor digitorum profundus  
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palmar surface of the  
medial 1½ fingers



# LESIONS OF ULNAR NERVE



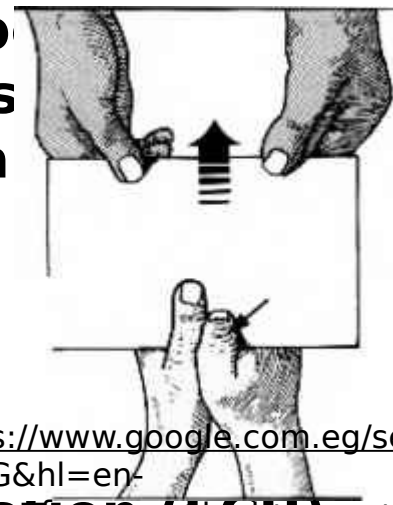
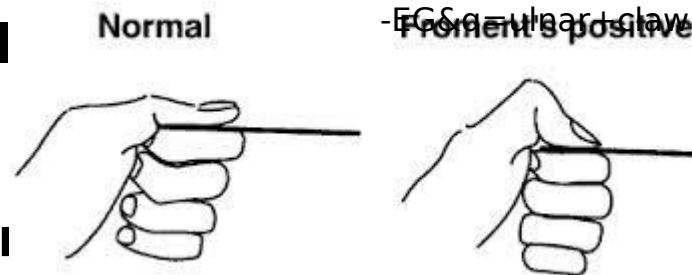
## 1. At wrist

- **Causes:**

- Stab wound
- Entrapment (ulnar tunnel)

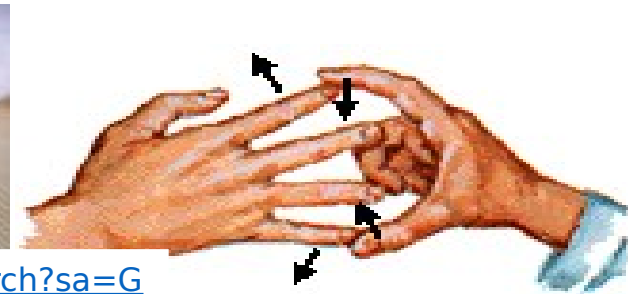
- **Effects:**

- **Paralysis** of all interossei & med. 2 lumbr.
- **Partial claw hand** (lat 2 lumbricals intact)
  - Loss of fingers abd. & add. (pap)
  - Adductor pollicis □ Froment's test
- **Anesthesia** in med. 1½ fingers (pa)



<https://www.google.com.eg/search?sa=G&hl=en>

EG&q=ulnar+claw+hand



<https://www.google.com.eg/search?sa=G&hl=en>

EG&q=ulnar+nerve+forearm

## 2. At elbow

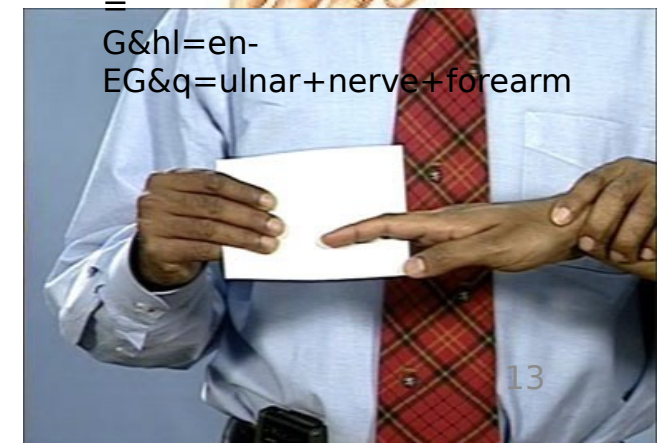
- **Causes:** fracture med. epicondyle

- **Previous effects +**

- Wrist flexion □ weak + radial deviation (+CU)
- Clawing □ Less apparent (**ulnar paradox** as med ½ FDP is paralyzed)

<https://www.google.com.eg/search?sa=G&hl=en>

EG&q=ulnar+nerve+forearm



**Which of the following structures is most likely to be damaged in association with a fracture of the **medial epicondyle** of the humerus ?**

- a) Radial artery
- b) Ulnar nerve
- c) Brachial artery
- d) Ulnar artery
- e) Median nerve



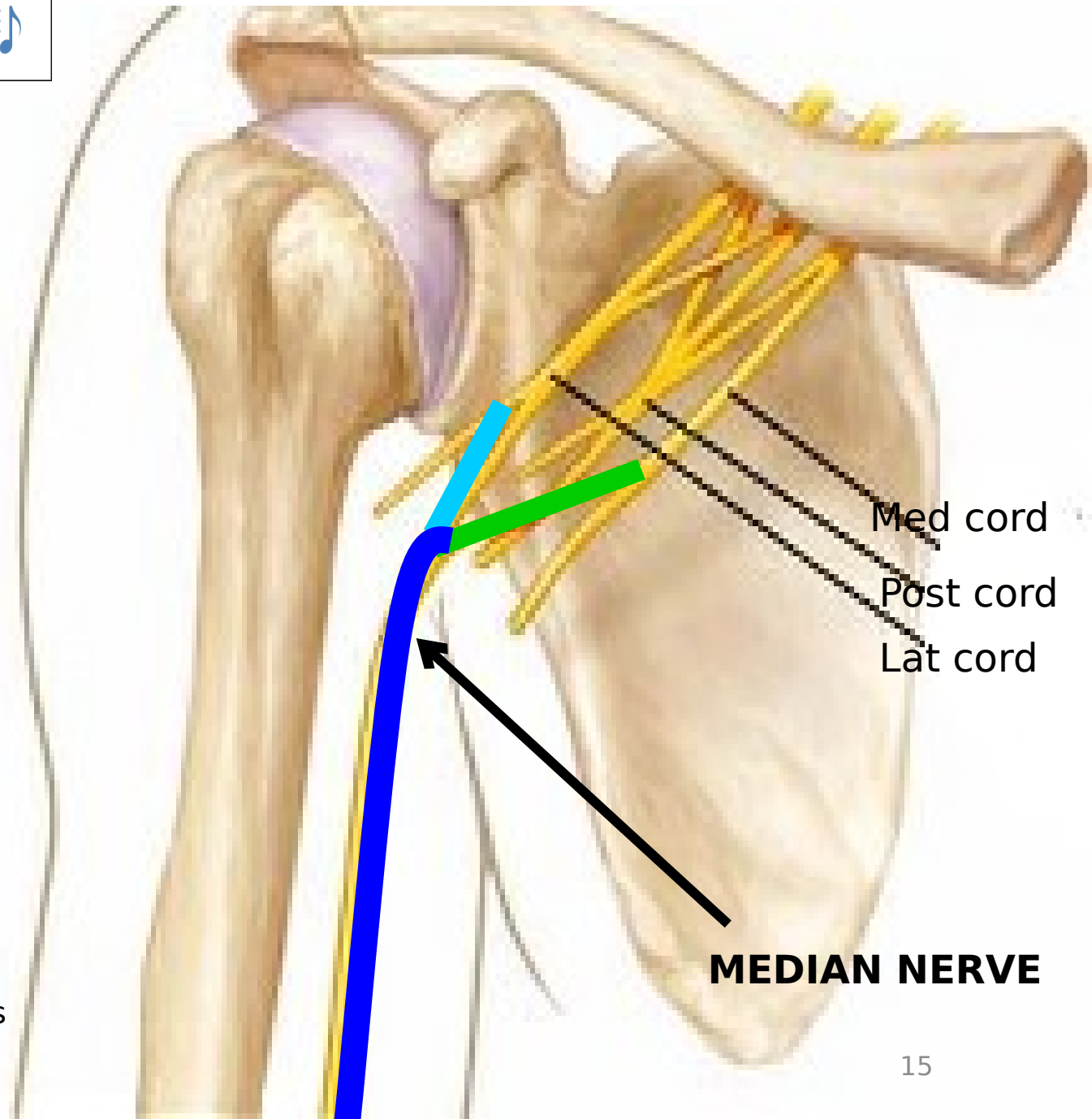


## The Median Nerve (C5,6,7,8,T1):

### ➤ Origin:

**Lateral root (C 5,6,7) from lateral cord of BP**

**Medial root (C8,T1) from medial cord of BP**



[https://lh3.googleusercontent.com/8HSvbN2cVAaVA4R2goA2SG3o55DGG3s\\_IWz8-](https://lh3.googleusercontent.com/8HSvbN2cVAaVA4R2goA2SG3o55DGG3s_IWz8-)



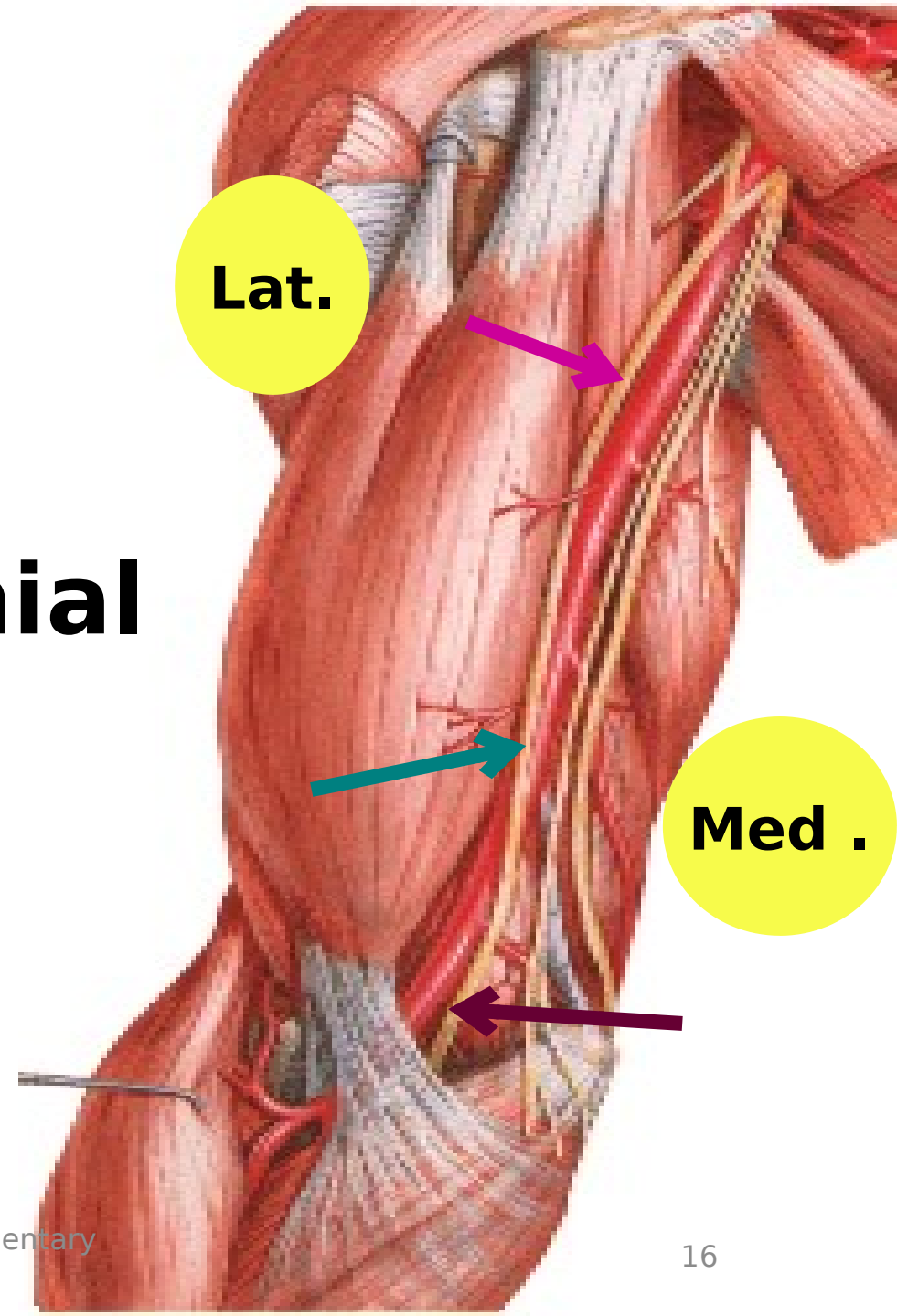
## In the Arm

**Lat. □ ant. □ med. to brachial artery**

**Median nerve gives no branches in the arm**

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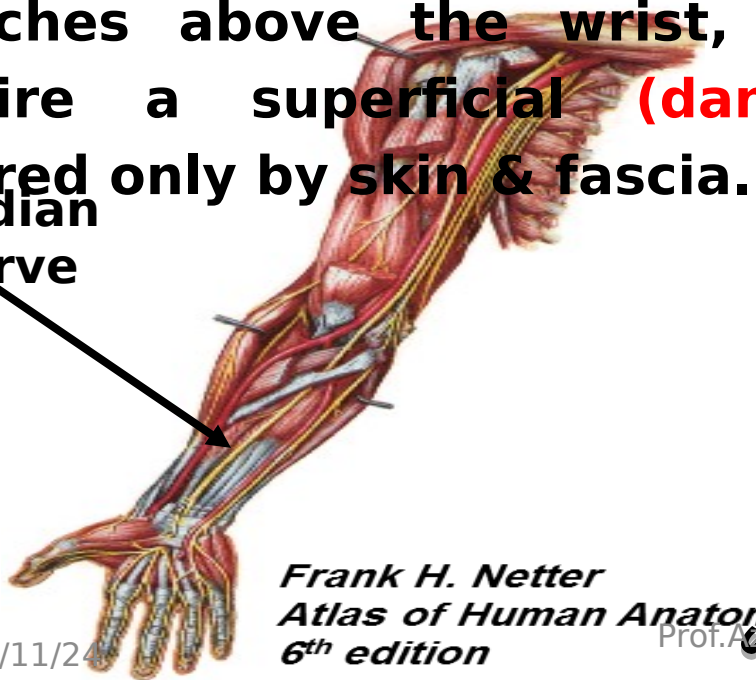


# In the Forearm



- ❑ It enters forearm between the 2 heads of pronator teres.
- ❑ Deep head of pronator teres separates **median nerve** from **ulnar artery**.
- ❑ It passes **between** flexor digitorum superficialis & flexor digitorum profundus.
- ❑ 2 inches above the wrist, median nerve winds to acquire a superficial (**dangerous**) position being covered only by skin & fascia.

Median  
nerve



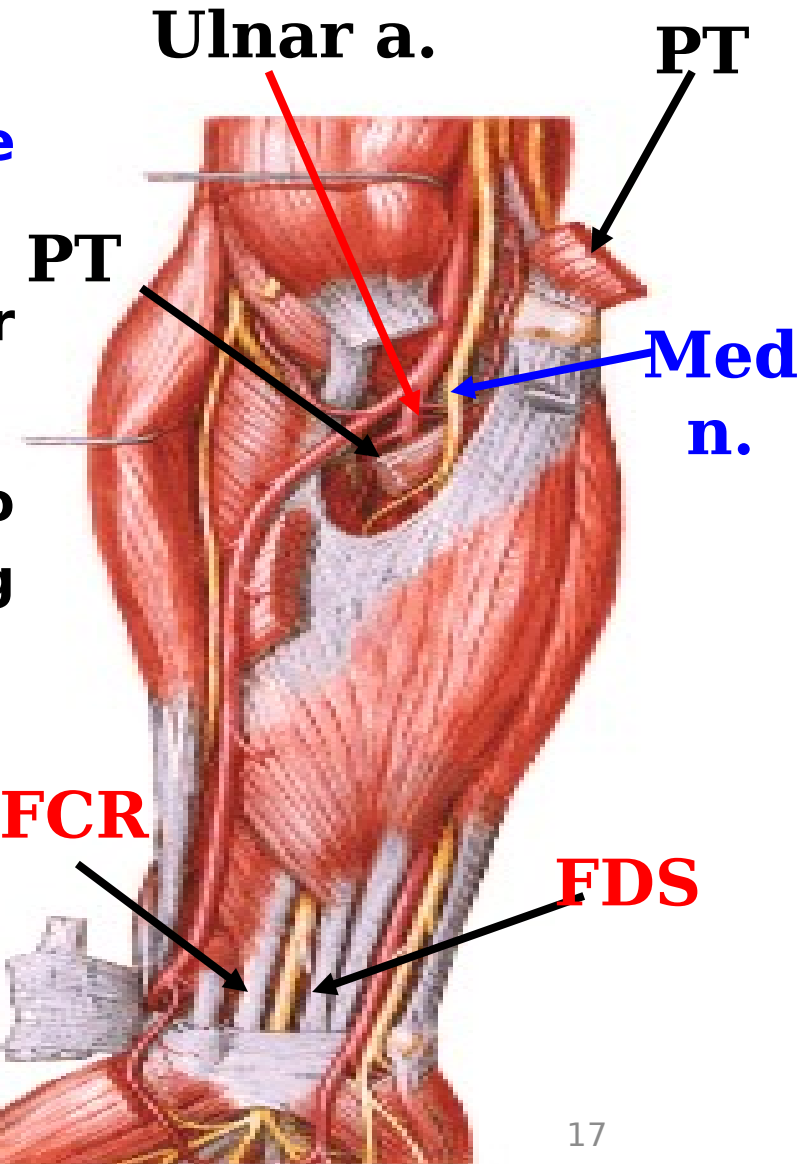
Frank H. Netter  
Atlas of Human Anatomy  
6th edition

Superf head of Pronator teres

Median  
nerve

Deep head of Pronator teres

Ulnar  
artery



Ulnar a.

PT

PT

Med  
n.

FCR

FDS

## 1. Muscular

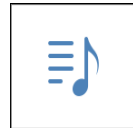
- pronator teres,
- flexor carpi radialis,
- palmaris longus &
- flexor digitorum superficialis

2. **Articular** to elbow and superior radioulnar joints.

3. **Palmar cutaneous** branch of median n for skin of the lateral 2/3 of the palm (hollow of palm)



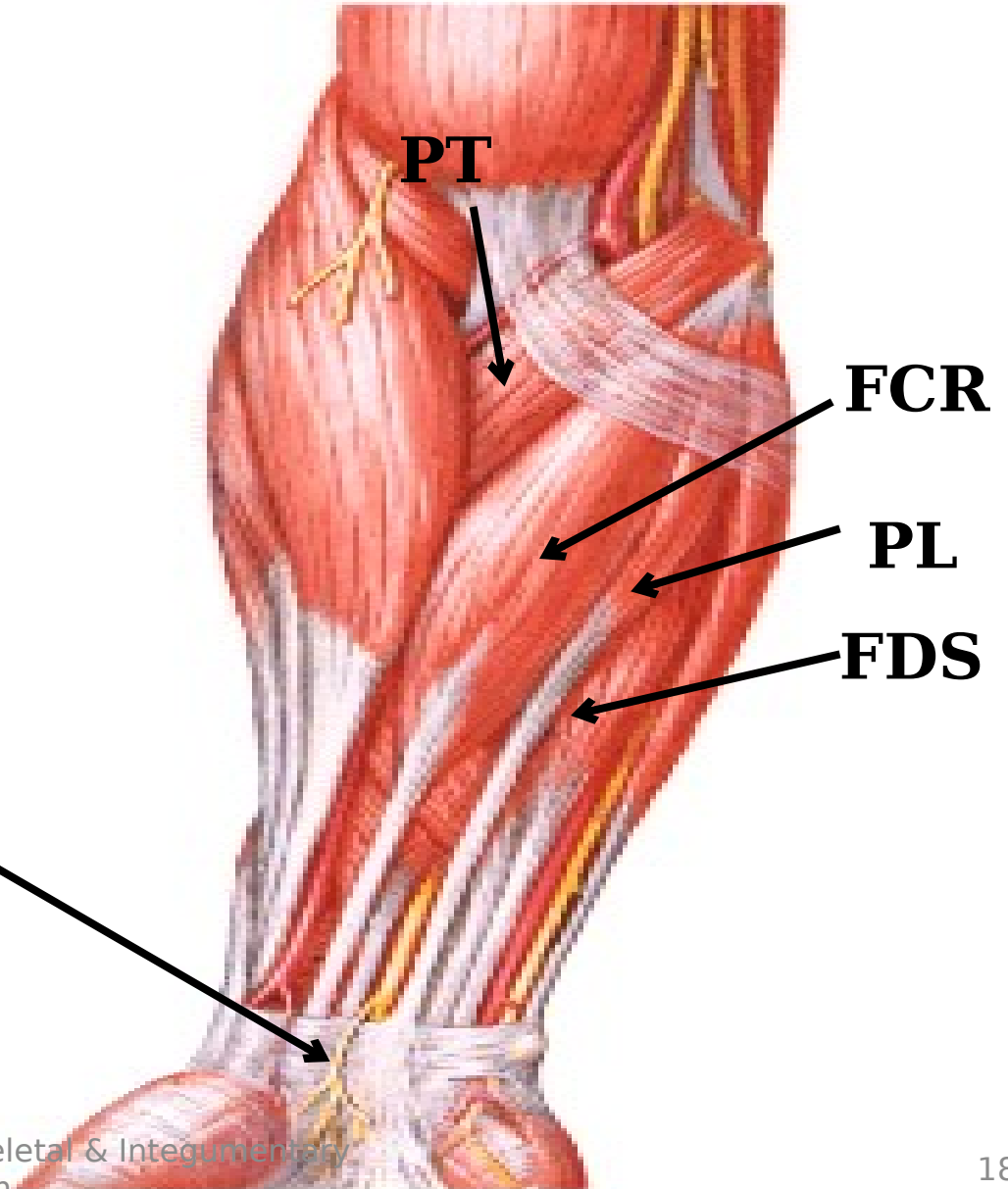
6/11/24



*Frank H. Netter  
Atlas of Human Anatomy  
6<sup>th</sup> edition*

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## Branches of the median nerve in the Forearm





## 4. Anterior interosseous nerve supplies:

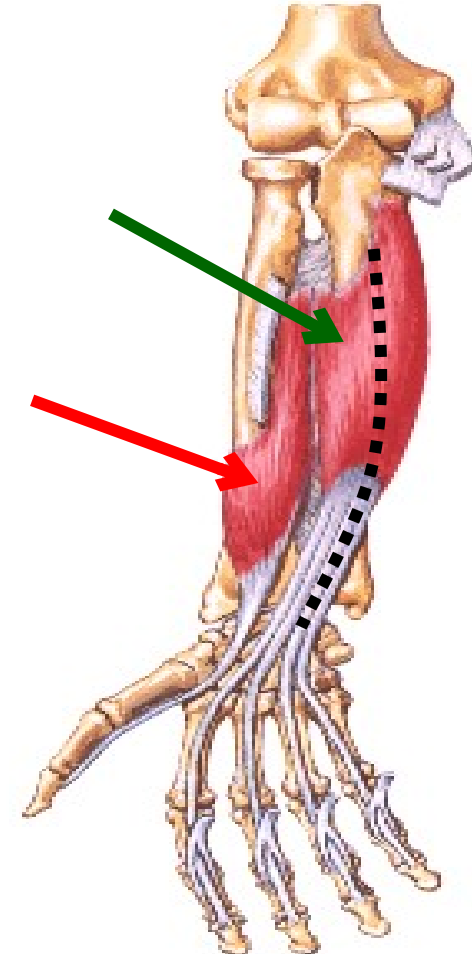
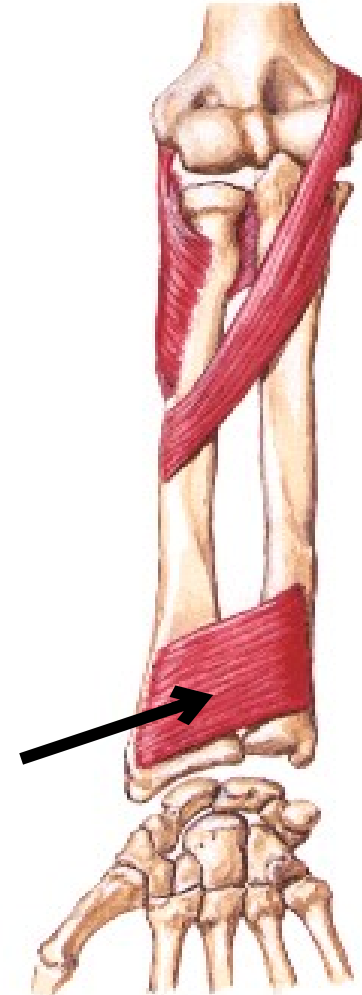
### A- Muscular:

- **flexor pollicis longus**,
- **lateral ½ of flexor digitorum profundus**
- **pronator quadratus**

### B- Articular branches:

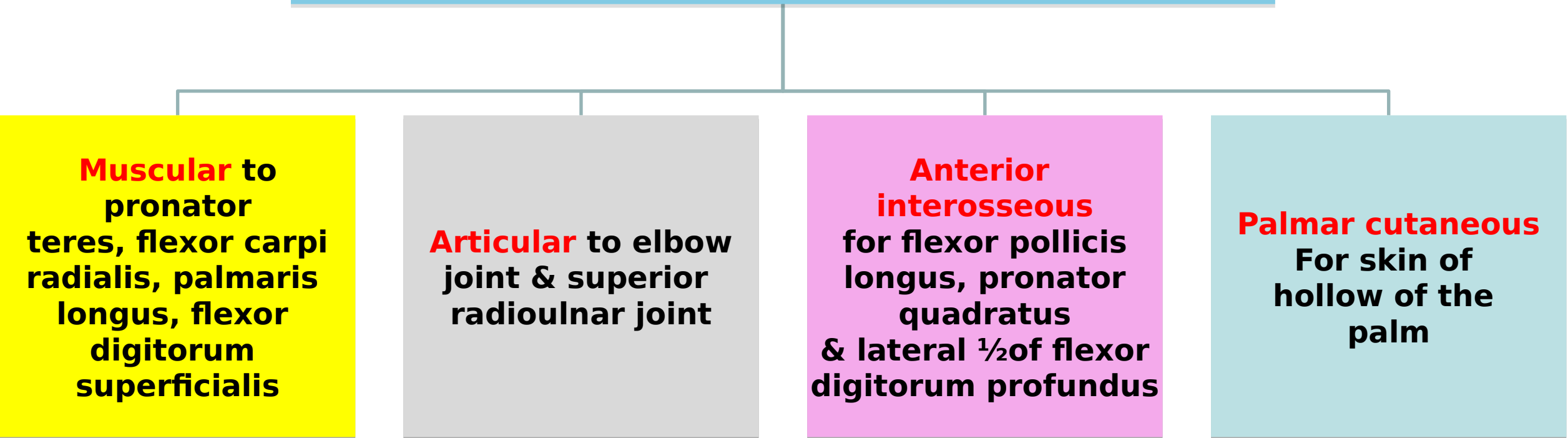
to inferior radio-ulnar and wrist joints.

*Frank H. Netter  
Atlas of Human Anatomy  
6<sup>th</sup> edition*





# Branches of Median nerve in Forearm





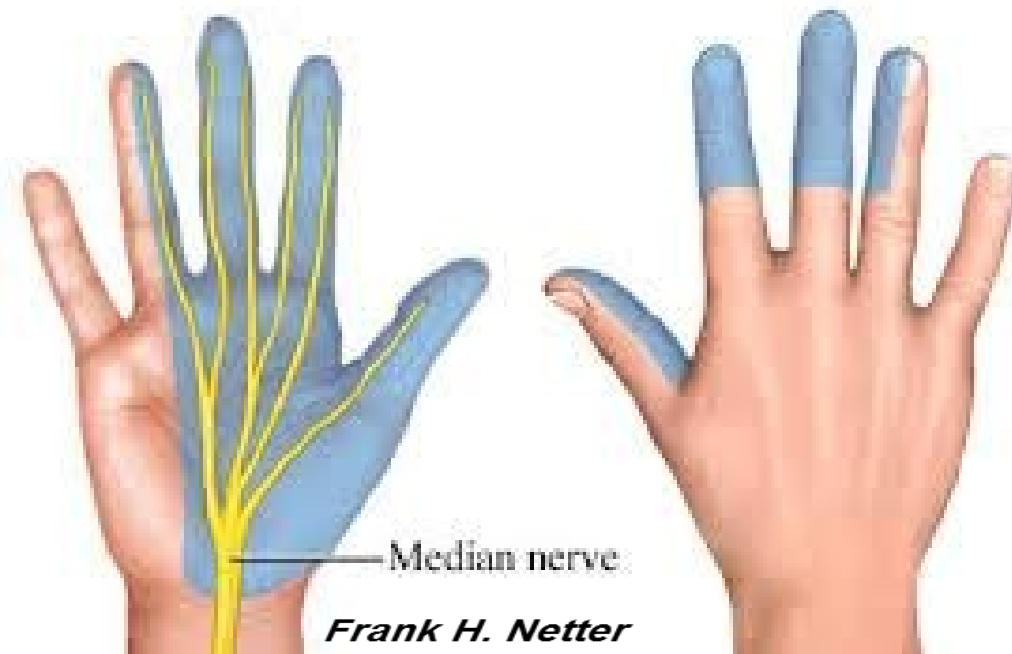
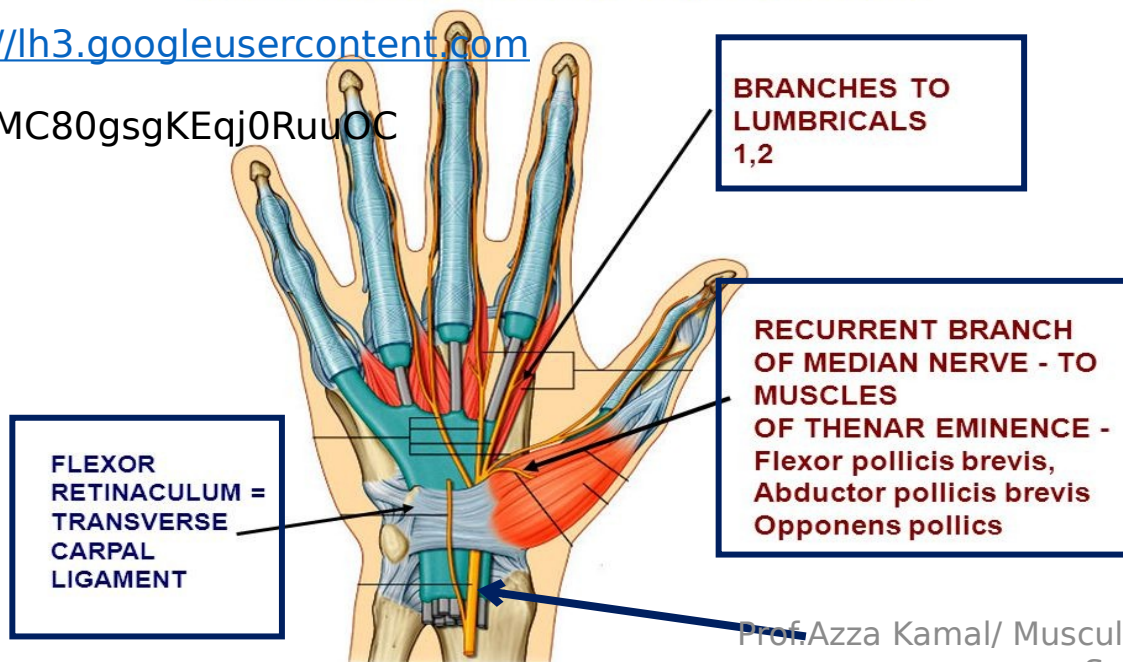
# Median nerve in the Palm:



- Enters palm **deep** to flexor retinaculum
- Branches: **LOAF** (Lat 2 **L**umbricals/ **O**P/**A**PB/**F**PB)
  1. To 3 muscles of thenar eminence + lateral 2 lumbricals
  2. To skin of palmar aspect of lateral 3½ fingers & dorsum of terminal & middle phalanges

MOTOR BRANCHES OF MEDIAN NERVE TO MUSCLES OF HAND PASS THROUGH THE CARPAL TUNNEL

<https://lh3.googleusercontent.com/L4nIOMC80gsgKEqj0RuuOC>



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# Median nerve

## 1. At elbow: injury:

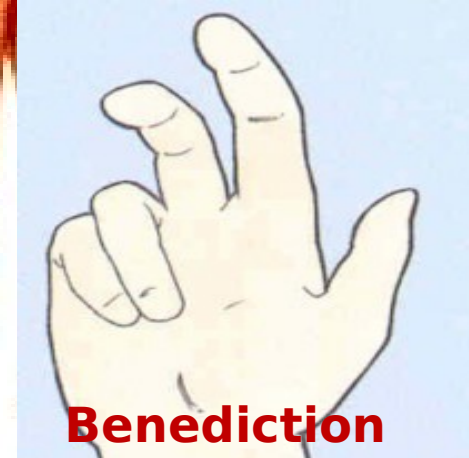
- Causes : Supracondylar fracture
- Motor effect:
- **Pronation** □ lost (2 pronators)
- **Wrist flexion** □ weak + ulnar deviation (intact FCU)
- **Fingers flexion** □ ask patient to make fist □ can't flex index and middle □ Benediction (lat. 1/2 of FDP paralysis but med. 1/2 of FDP intact)
- **Thumb flexion** □ loss of (FPL+ Brevis)
- **Paralysis of thenar eminence muscles** □
  - Flat thenar eminence,
  - Lost thumb opposition (counting test)
  - **Ape hand deformity.**



[https://lh3.googleusercontent.com/KIMTV\\_vOGuthrg9FwUHRJ](https://lh3.googleusercontent.com/KIMTV_vOGuthrg9FwUHRJ)



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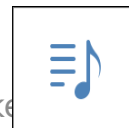


**Benediction**



**Ape Hand Deformity**

<https://lh3.googleusercontent.com/1bpA>



## Sensory

Loss of: sensation over the lateral 2/3 of the palm and the palmar surface of the lateral 3½ fingers and over their distal part on the dorsal surface.



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Atlas of Human Anatomy  
6<sup>th</sup> edition*



# Median nerve injury:

## 2. At wrist:

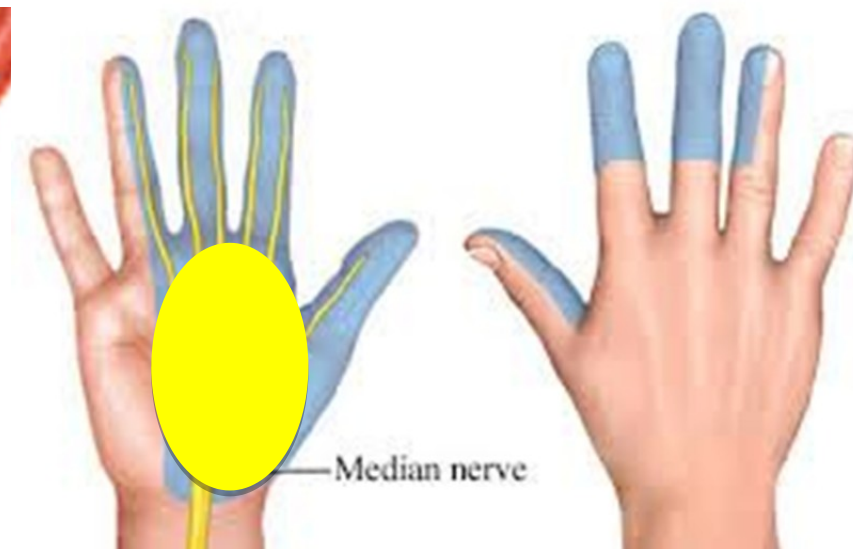
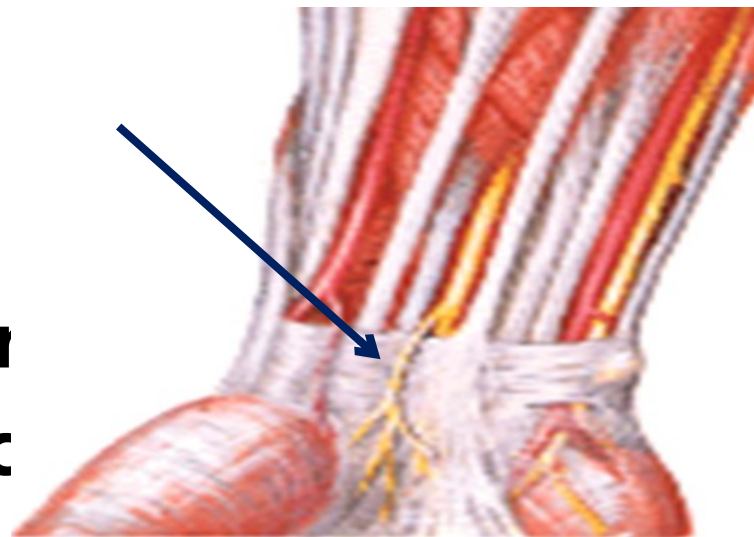
### ■ Causes

- carpal tunnel syndrome
- cut wounds (suicidal)

### ■ Motor effects:

- **Paralysis** of thenar eminence muscles □ Flat thenar eminence, lost thumb opposition and **Ape hand deformity**

- **Sensory loss** in lat. 3½ fingers [palmar surface & middle & distal phalanx dorsally].



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<https://lh3.googleusercontent.com/1hpA>



# What is carpal tunnel syndrome?

**Carpal tunnel syndrome:** a pathological lesion which diminishes the size of the tunnel and compresses the median nerve.

## ●Causes:

- 1- Arthritis in carpal bones.
- 2- Inflammation of the synovial sheaths.

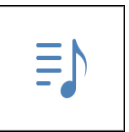
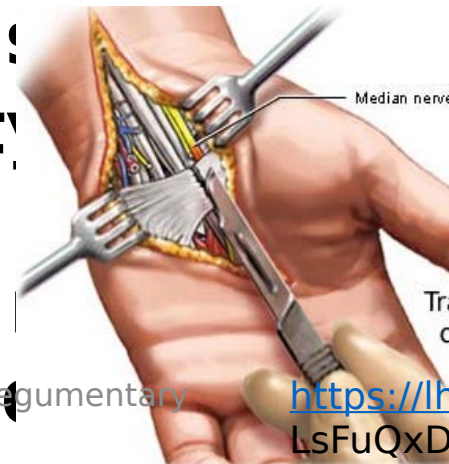
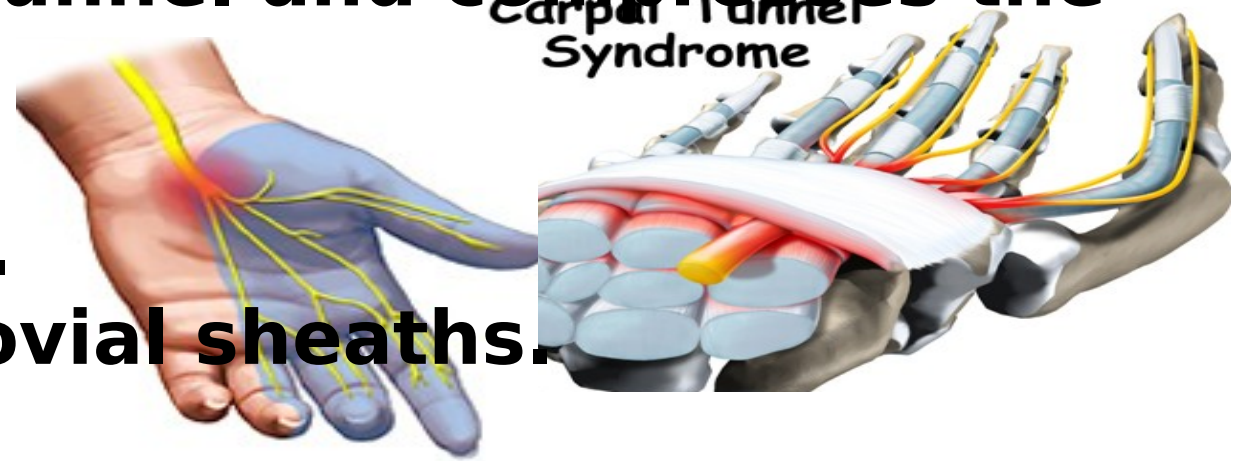
## ●Results:

- 1- Burning pain i.e. pins & needles up to sensory loss along palmar surface of the lateral 3½ fingers but **sensation is normal in hollow of palm.**

- 3- Weakness and flattening of muscle eminence with ape hand deformity

## ●Treatment:

longitudinal incision of the flexor  
to relieve compression of the me



# Now Let's Summarize

## LESIONS OF MEDIAN NERVE

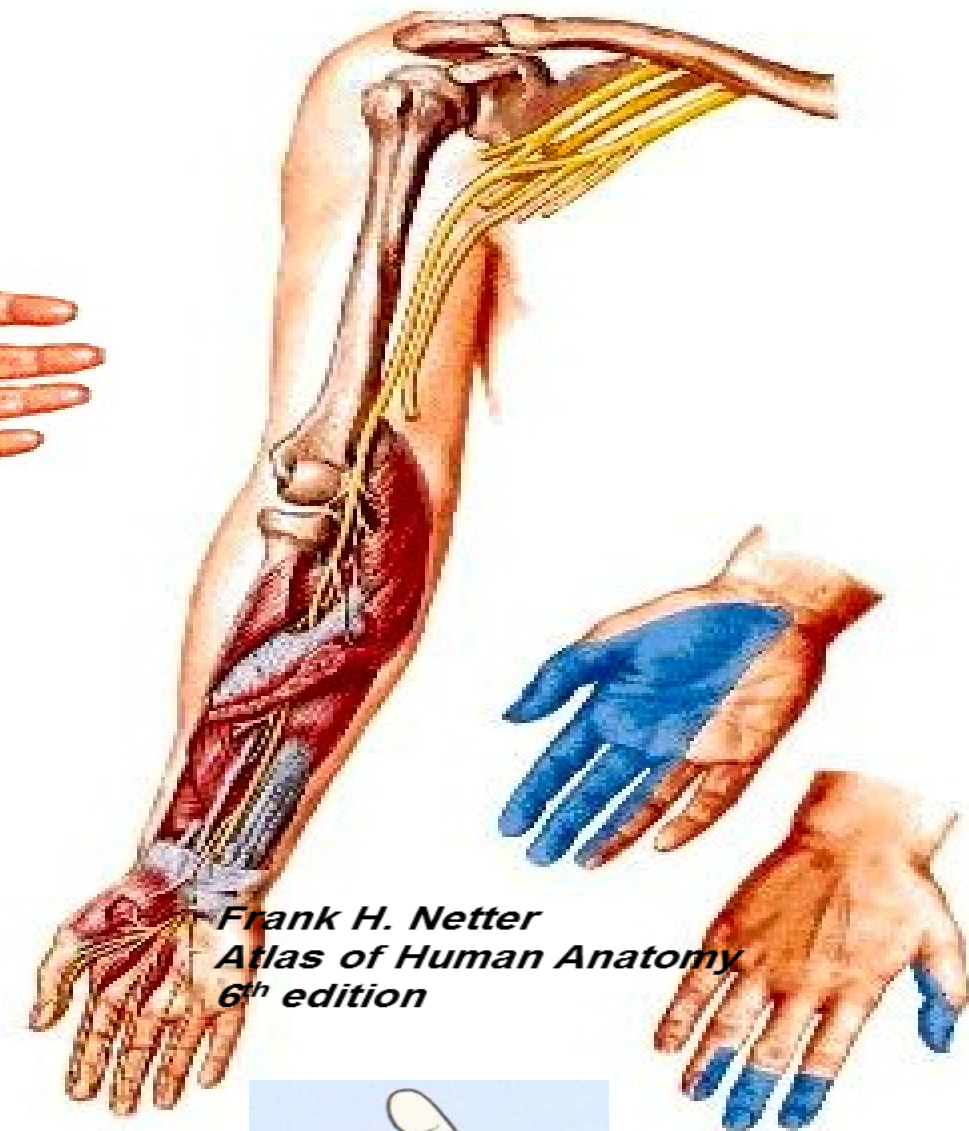
### 1. At wrist:

- **Causes**
  - carpal tunnel syndrome
  - cut wounds (suicide)
- **Effects: "Ape hand"**
  - **Paralysis** of thenars □
    1. Flat thenar eminence
    2. Lost thumb opposition
    3. Weak thumb abduction & flexion
  - **Sensory loss** in lat. 3½ fingers [palmar surface & middle & distal phalanges dorsally].



### 2. At elbow:

- **Causes**
  - Supracondylar fracture
- **Previous effects +**
  - Pronation □ lost (2 pronators)
  - Wrist flexion □ weak + ulnar deviation (FCU intact)
  - Fingers flexion □ ask patient to make a fist □ he can't flex index & middle due to paralysis of lat ½ of FDP □ Benediction
  - Thumb flexion □ lost
  - Sensory loss : lat. 2/3 of palm + lat. 3½ fingers [palmar surface & middle & distal phalanges dorsally].



**A patient arrived to the hospital after receiving a deep cut in the front of his forearm just above the wrist. He was diagnosed with a double ulnar & median nerve injury. Which of the following is the deformity you expect to see in this patient?**

- a) Partial claw hand
- b) Complete claw hand
- c) Winging of scapula
- d) Wrist and finger drop
- e) Flat shoulder



<b>Deformity</b>	<b>Nerve Injured</b>
<b>Winging of scapula</b>	<b>Long thoracic nerve</b>
<b>Flat shoulder</b>	<b>Axillary nerve</b>
<b>Ape hand</b>	<b>Median nerve</b>
<b>Partial claw hand</b>	<b>Ulnar nerve</b>
<b>Complete claw hand</b>	<b>Median and Ulnar</b>
<b>Waiter's tip position</b>	<b>Upper trunk of BP (Erb's Paralysis)</b>
<b>Complete claw hand</b>	<b>Lower trunk of BP ( Klumpke's Paralysis)</b>







**Suggested Textbook**

Clinical Anatomy for Medical Students/  
Richard S. Snell

Third Edition/ Pages 532-537

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